APPENDIX C
1988 Mohave Ground Squirrel Stipulation and Mitigation Plan

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STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of:)	Docket No. 88-SPPE-1
Application for a Small)	
Power Plant Exemption)	STIPULATION FOR THE MITIGATION OF IMPACTS
for the Coso Navy 2)	TO THE MOHAVE GROUND SQUIRREL AT THE
Geothermal Project)	COSO KNOWN GEOTHERMAL RESOURCES AREA

1. The attached Stipulation, with explanatory documents, bears obvious relevance to the Small Power Plant Exemption process.

2. The Stipulation of October 4, 1988, consists of 7 pages. The companion materials total 20 pages and are intended to afford an insight into those discussions and developments which led to the present Stipulation.

Dated: 10/27/88

Thomas M. Bayne
Naval Weapons Center
Geothermal Legal Advisor

Proof of Service filed with original.
Mailed from Ridgecrest, CA on 27 October 1988.

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STIPULATION FOR THE MITIGATION OF IMPACTS TO THE MOHAVE GROUND SQUIRREL AT THE COSO KNOWN GEOTHERMAL RESOURCE AREA (KGRA)

GOALS AND OBJECTIVES

The goal of this mitigation plan is to offset adverse impacts and to assure no net loss to the state-listed (threatened) Mohave ground squirrel (MGS) resulting from geothermal exploration and development in the Coso KGRA. The objectives of this mitigation plan are:

A. to develop and implement specific actions which will:
- enhance known Mohave ground squirrel habitat not permanently used for geothermal power purposes;
- create more favorable conditions within the disturbed areas by means of rehabilitation of temporarily disturbed areas;
- relieve competitive pressure on the MGS; and,
- reduce both short and long term impacts.

B. to provide a mechanism, in the form of a "mitigation bank," whereby all geothermal developers at Coso KGRA can participate in the mitigation program.

SCOPE OF THE PLAN

This plan is designed to provide mitigation for a maximum of 2158 acres of surface disturbance on the China Lake Naval Weapons Center (NAVWPNCEN), and up to 35 acres of disturbance outside the boundaries of the NAVWPNCEN on public lands within the Coso KGRA. Once the 2,193 acres of approved surface disturbance has been reached, no further disturbance may be permitted under this mitigation plan; at that point additional mitigation measures must be developed and approved by the cognizant agencies. "Surface disturbance" includes long-term as well as short-term (temporary) disturbance except for acreage disturbed for conductor stringing of transmission lines. Also, all lands disturbed by geothermal development within the Coso KGRA prior to initiation of this plan shall be included in the total of disturbed lands.

This document is a reformulation of the original Coso geothermal resource area Mohave ground squirrel mitigation plan that was approved in March 1988, by NAVWPNCEN and The Bureau of Land Management (BLM) and concurred in by the California Department of Fish and Game (CDFG). The plan as originally written remains unchanged. This stipulation merely represents a reorganization of all requirements into a single comprehensive document. For reference, the original MGS mitigation plan is contained in Appendix A of this document.

APPROACH

The approach adopted in this plan involves both active and passive techniques for attaining the aforementioned goal. Active techniques include habitat enhancement

actions (brush piles, exclusion of exotic ungulate competitors, revegetation) while passive techniques include habitat maintenance actions (minimum surface disturbance, lowered vehicle speed limits, management of geothermal fluid sumps).

The basic hypotheses of this plan are:

- Adequate mitigation can be achieved through development and implementation of a sound plan.
- The MGS population is in balance with other animals sharing the habitat.
- Significant temporal and spatial changes in the MGS population can be detected and can be related to both geothermal activities and habitat enhancement management actions taken under this plan.

THE PLAN

The MGS mitigation plan consists of six major elements which are all interrelated, and the effects of which will likely be difficult to distinguish one from another. These elements are:

1. Exclusion of grazing by cattle and burros.
2. Surface disturbance management.
3. Creation and enhancement of favorable habitat.
4. Institution of indirect mitigation actions.
5. Conduct of a baseline data acquisition and monitoring program.
6. Establishment of a funding mechanism.

1. Grazing Limitation

It is believed that significant adverse ecological pressure is brought to bear on the MGS population by the presence of cattle and burros. These animals compete with the MGS for scarce food supplies and may destroy MGS habitat through trampling.

The primary aspect of the grazing limitation requires the construction of a grazing exclosure consisting of a five-strand barbed wire fence excluding herbivores from 43,500 acres of land as shown in Figure 1. The fence will be constructed and completed between June 1, 1989 and November 30, 1989. The fence shall be maintained throughout the active life of the geothermal field. Effectiveness of the exclosure will be evaluated during the 1990-91 grazing season by means of the monitoring plan.

Also as part of this mitigation element, the feral burro management program will continue on the NAVWPNCEN and the surrounding BLM lands. One objective of this equine management program is to remove all exotic ungulates from the Coso KGRA development area.

Further, a water source shall be provided for cattle outside the exclosure. The site of the source shall be determined by the BLM in consultation with the grazing allottee.

2. Surface Disturbance Management

The basic tenets of surface disturbance management are:

- in all possible instances, disturbed areas will be reclaimed at the earliest possible time.
- for any given geothermal activity a minimum amount of surface area will be disturbed.
- all surface disturbance will be limited to approved areas.

Specifically, surface disturbance management will include:

a. minimizing size and number of well pads.
b. utilizing multiple wells per pad wherever feasible.
c. using existing access roads wherever possible.
d. minimizing the width and length of new roads.
e. re-contouring all piles, pits, sumps, and other disturbed areas as soon as possible, after it is determined they are no longer needed.*
f. revegetating disturbed areas immediately after cessation of surface disturbing operations.*
g. leaving pockets of native vegetation in place wherever possible to hasten re-establishment of native flora.
h. stockpiling the top 2" to 6" of topsoil removed from construction sites. This topsoil shall be redistributed over areas that are being revegetated.
i. cut and fill slopes shall be at least 2:1, not steeper unless approved in writing by the authorized officer.

3. Conservation and enhancement of habitat

It is believed that habitat for Mohave ground squirrels can be both conserved and enhanced by using some fairly simple practices during surface disturbance activities. Vegetation from construction sites and drill pads should be grubbed, crushed, and stockpiled in previously disturbed areas. Further, it should be placed so as not to obstruct the natural drainage channels. These brush piles provide added cover for small reptiles, insects, and mammals such as the MGS.

4. Indirect mitigation actions

These actions were previously referred to as passive techniques or habitat maintenance procedures. It is not known that these procedures will directly benefit the MGS, but it is generally agreed that MGS will accrue some benefits as will all other wildlife. In some instances, the actions

(*NOTE: according to specifications agreed upon by BLM and NAVWPNCEN)

described below have other ancillary environmental benefits outside of those for wildlife, e.g., lowered speed limits generally mean less airborne dust.

a. Speed limits of 25 mph shall be observed on all secondary range roads within the KGRA. This will reduce the likelihood of roadkills.
b. Open reserve sumps and mud pits shall only be used for containment of drilling and geothermal fluids during drilling operations, well testing, and emergency situations, unless specifically authorized by BLM and NAVWPNCEN.
c. Side slopes of fluid sumps or pits shall be graded to a 2:1 ratio to allow greater likelihood of escape for wildlife that may fall into the pits.
d. All trash, equipment, and waste shall be removed and properly disposed of as soon as possible.
e. Hazardous waste shall be placed in approved containers and disposed of at authorized sites outside of the NAVWPNCEN.

5. Baseline and Monitoring Program

In order to assess the effectiveness of this mitigation plan, a baseline data acquisition and monitoring program will be conducted. Details of this program are contained in Appendix A, "Scope of Work, Baseline and Monitoring Study of Proposed Coso Grazing Exclosure, Coso Known Geothermal Resource Area," by Philip and Barbara Leitner (March 12, 1988, as revised).

Baseline data will be acquired in calendar years 1988 and 1989. Monitoring will continue through the year 2000.

BLM and NAVWPNCEN, in conjunction with the CDFG and other invited parties, shall review the baseline and monitoring data on a periodic basis (to be established by mutual agreement). BLM, NAVWPNCEN, and CDFG will determine if the mitigation measures have met, exceeded, or fallen short of the goal and objectives of this plan. These reviews shall also produce recommendations for modification of the plan, as necessary, to increase the likelihood of attaining the goal and objectives.

Alternative mitigation may include, but is not limited to, expansion of the grazing exclosure, offsite habitat improvement, and rehabilitation of disturbed areas or other acceptable MGS measures continuing for the term of the impacts of the project. The final disposition of impacts at any given site will be addressed in the plans of abandonment and reclamation filed by the developers for that site.

6. Establishment of a funding mechanism

Geothermal developers which agree to participate in this mitigation package shall participate in funding the Mohave ground squirrel mitigation bank. California Energy Company and China Lake Joint Venture shall fund the entire cost of the mitigation bank. California Energy Company, et al.

shall make provisions to allow other developers to contribute to the bank on a pro rata basis based on their acreage of disturbance. The amount contributed shall be sufficient to cover all costs associated with the mitigation described in this plan. Specifically, the mitigation bank shall be used to:

a. fund the cattle and burro exclusion element.
b. fund the baseline data acquisition and monitoring element.

COMPENSATION PROTOCOL

The following factors will be considered by the NAVWPNCEN, BLM, and CDFG in determining the effectiveness of the Coso Mohave Ground Squirrel Mitigation Plan:

1. The effectiveness of the exclosure will be evaluated during the 1990-1991 grazing season (see: Estimate of Grazing Pressure, Final Study Design).

2. In September 1993, the chief scientist for the monitoring study will present results of MGS trapping conducted between 1988 and 1993 to representatives of BLM, NAVWPNCEN, and CDFG. This presentation will include calculations of the relative abundance and/or population densities of MGS on the four study sites, computed using at least three different technically recognized methodologies. The chief scientist will include his recommendation as to the most appropriate method(s) to use in expressing the abundance of MGS on the study sites. The agencies will then agree upon and adopt one or more methods of determining MGS abundance.

3. The basin and bajada lands within the Coso grazing exclosure are considered capable of producing measurable increases in carrying capacity for the MGS, as these areas appear to be favored by the species and to receive the majority of cattle use. Figure 2 shows basin and bajada areas within the Coso grazing exclosure. These areas are calculated to total 19,308 acres.

4. Total disturbed acreage will be calculated on an annual basis by means of the ground-verified surface disturbance data provided by each developer, and spot-checked by the agencies.

5. The recovery of vegetation within the exclosure will be measured per the description in the Final Study Design. The quality of the shrub cover will be defined, as well as the species composition and total standing crop of the herbaceous layer.

6. Revegetation plans will be developed and implemented and will include monitoring and follow-up to assess the success in reclaiming disturbed lands.

In the year 2000, the NAVWPNCEN, BLM, and CDFG will individually and collectively evaluate the results of the baseline data acquisition and monitoring program within the context of the six factors mentioned above to determine the effectiveness of the Mitigation Plan. Correlations will then be derived between MGS population trends, habitat improvement, and habitat loss resulting from geothermal operations. These correlations will enable the agencies to determine if additional

mitigation will be required to offset adverse impacts and to assure no net loss to the MGS. Establishment of strict formulas for judging the success of the Mitigation Plan in advance of a more complete suite of baseline and monitoring data being in hand is not justifiable. A preliminary value of approximately 13% increase of MGS on study plots has been identified as a target to measure the success of the mitigation plan if the entire projected surface disturbance occurs. This value is subject to revision by mutual agreement of BLM, NAVWPNCEN, and CDFG when further baseline data become available. At such time as more analyzed data are available, representatives of the three aforementioned agencies will reevaluate the success criteria and make revisions as appropriate.

ROLES AND RESPONSIBILITIES

Following is a description of the major roles and responsibilities of the key players in the implementation of this mitigation plan.

1. Geothermal Developers. This includes Navy contractors and all BLM lease holders and operators within the Coso KGRA. All present and future developers shall either participate in this mitigation plan or develop alternative mitigation measures acceptable to BLM and NAVWPNCEN and concurred in by CDFG.

Geothermal developers which agree to participate in this mitigation package shall contribute a pro rata amount to the Mohave ground squirrel mitigation bank. Starting in 1989, each participant in this mitigation package shall maintain ground verified records of surface disturbance acreage and report these to BLM and NAVWPNCEN annually on or before January 31.

2. China Lake Naval Weapons Center. NAVWPNCEN is the ultimate responsible agency for all matters related to surface use on NAVWPNCEN lands, and is the subsurface manager for the Navy fee title lands within the KGRA. As such, NAVWPNCEN is committed to leasing and development of geothermal resources on NAVWPNCEN lands provided it can be done in a manner that is compatible with the military mission of NAVWPNCEN. NAVWPNCEN is also committed to ensuring that the mitigation plan is executed within the areas of NAVWPNCEN permitting authority, and will continue its feral equine management at Coso KGRA.

3. Bureau of Land Management. Pursuant to the authority of Public Land Order 5942 (May 18, 1981) which provides for leasing of certain lands within the China Lake Naval Weapons Center for geothermal resource development and the related Memorandum of Understanding between BLM and NAVWPNCEN, BLM was granted certain rights to administer Federal leases on a portion of the Coso KGRA. As lessor, BLM has responsibility for managing all surface and subsurface activities on its leases within approved areas of operations so long as such activities do not interfere with the primary mission of the NAVWPNCEN. BLM is also responsible for ensuring that all of its lessees adhere to terms and conditions of their leases and plans of operation derived therefrom. With NAVWPNCEN, BLM jointly approves environmental analyses of proposed actions on land within their purview. The BLM agrees to

include this mitigation plan in all permits it issues within the Coso KGRA and to require developers to adhere to its terms through the life of the geothermal operations. In the event cattle are found in the exclosure area, BLM shall oversee their removal within 10 days.

4. California Department of Fish and Game. CDFG is the state trustee agency responsible for the protection and management of the state's fish and wildlife, including state-listed rare, threatened and endangered species.

The BLM, NAWWPNCEW and CDFG will (1) annually review the results of the monitoring study, (2) review the acreages of disturbed lands as submitted by the developers, (3) review the success of the mitigation program and review the revegetation efforts. During January 1993, after three years of cattle exclusion, the agencies shall meet to evaluate the extent to which the mitigation goal has been met and to determine the current value of the mitigation program. If by the year 2000, the monitoring study fails to show that the mitigation program has accomplished its goal, or if the acreage of disturbed lands exceeds 2,193 acres at any point in time, the agencies shall develop alternative measures (to be implemented by the Geothermal Operators) that will provide complete compensation for geothermal resource development impacts on the MGS at the Coso development area.

Approved By:

Patricia E. McLean Date 10/4/88
Patricia E. McLean
Area Manager
Ridgecrest Resource Area
Bureau of Land Management

Carl P. Austin Date 5 Oct 88
Carl P. Austin
Head, Geothermal Program Office
Public Works Department
China Lake Naval Weapons Center

Concurrence By:

George D. Nokes Date 10/7/88
George D. Nokes
Regional Manager
Department of Fish and Game
State of California-The Resources Agency

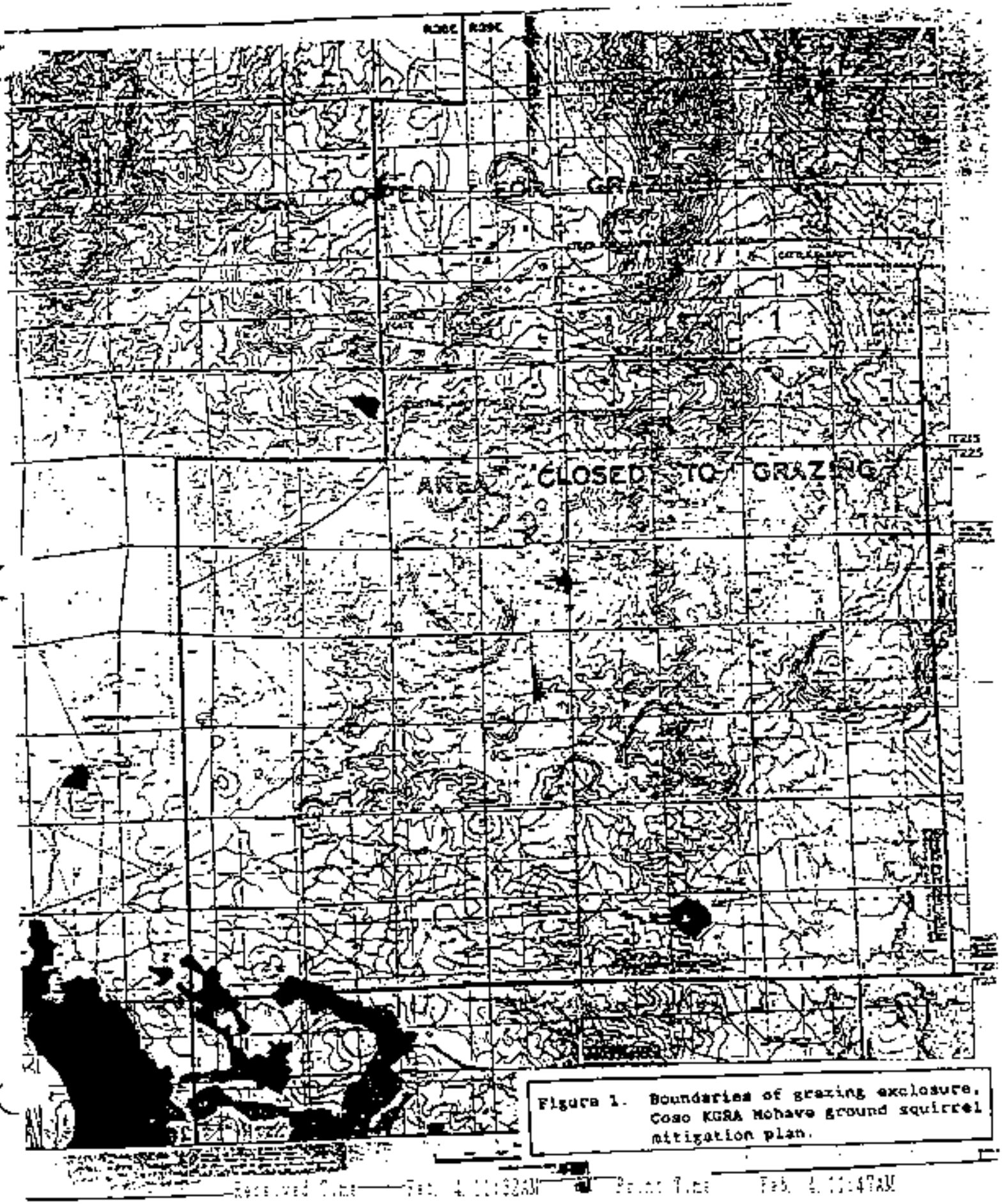

Figure 1. Boundaries of grazing exclosure, Coso KGRA Mohave ground squirrel mitigation plan.

APPENDIX A

APPROVED MOHAVE GROUND SQUIRREL

MITIGATION PLAN

STIPULATION FOR THE MITIGATION OF IMPACTS TO THE MOHAVE GROUND SQUIRREL

These stipulations will be refetenced in all surface disturbance permits approved after concurrence of the 1988 mitigation plan by the California Department of Fish and Game, for geothermal operations proposed by California Energy Company, Inc., China Lake Joint Venture, and Los Angeles Department of Water and Power within the China Lake Naval Weapons Center (NAVWPNCEN) portion of the Coso Known Geothermal Resource Area (KGRA) and for transmission line facilities associated with the geothermal operations. This stipulation requires developers to either become signatories to the approved mitigation plan or to develop alternative mitigation in consultation with the California Department of Fish and Game.

The approved mitigation plan is described as follows: The geothermal developers have agreed to contribute to a mitigation bank, henceforth referred to as "bank". Funds from this bank will be expended to achieve the mitigation measures listed below. The developers' funding responsibility for this bank is detailed in the "Implementation Agreement for Cost Sharing, Mohave Ground Squirrel Mitigation Plan."

The developers' responsibilities under the mitigation plan include:

1. The bank will provide for construction of a five-strand barbed wire fence at locations shown on Exhibit A in the fall of 1989, and maintenance of this fence throughout the active life of the geothermal field. Since the objective of the mitigation plan is to exclude exotic herbivores from some 38,000 acres of KGRA lands, the effectiveness of the fence in excluding cattle will be evaluated during the 1990-91 grazing season. If cattle are continuing to enter the

exclosure, there will be consultation between developers and the regulatory agencies to determine additional methods which will achieve the objective of exclosure.

2. The bank will fund a baseline and monitoring study, as detailed in Exhibit B. The first year of baseline data collection will be 1988. The last year will be 2000.

3. The bank shall establish a water source for cattle outside the exclosure at a site to be determined by the NAVWPNCEN in consultation with the rancher. Signatories to the Implementation Agreement (developers), the NAVWPNCEN, the Bureau of Land Management (BLM), and the California Department of Fish and Game (CDFG) may meet in late 1988 or early 1989 at the recommendation of the monitoring study's project lead scientist or the regulatory agencies. The purpose of this meeting would be to review the results of the baseline study, in order to refine sampling methodology. The project lead scientist or the regulatory agencies may call meetings annually thereafter to review results of the previous year's study.

The funding of the last year of monitoring, in the year 2000, is contingent upon continuation of geothermal operations. Operations will be considered abandoned, and the last year of monitoring will not be required, if Plans of Abandonment have been filed by all developers before the year 2000.

4. Each environmental document submitted to the NAVWPNCEN or BLM must include an update of the acreage of cumulative surface disturbance from geothermal operations. Surface disturbance includes both those lands committed to operations for the life of the project and those lands revegetated immediately after disturbance. Lands temporarily disturbed during stringing of conductors are not included in the count of acreage disturbed. Each developer will maintain ground verified records of surface disturbance acreage and make the records available to regulatory agencies and other developers.

5. The following set of operating conditions shall be observed:

a. Pad sizes shall be minimized and access to the project area shall be confined to existing routes to the extent possible to reduce habitat loss. Existing access to the pads will be used wherever possible; if new access spurs must be developed, they shall be of the minimum width and length needed to accommodate equipment and operations.

b. Stockpiled bladed vegetation and excavated materials shall not obstruct the natural flow of water down wash systems. Vegetation and other materials removed during grading or construction should be stored on previously disturbed sites in order to reduce impacts to additional habitat and to stabilize soils by reducing erosion caused by wind and water. Stockpiled vegetation and topsoil will be used to facilitate revegetation.

c. To reduce the potential for drowning of Mohave ground squirrels, open reserve sumps and mud pits shall only be used for containment of drilling and geothermal fluids during drilling operations and well testing, and containment of emergency flows. Side slopes on fluid sumps or pits will be graded to a 1:2 ratio to allow wildlife to escape.

d. Whenever possible, pockets of native vegetation will be left to hasten re-establishment of native flora.

e. To minimize the potential for roadkills of Mohave ground squirrels, a speed limit of 25 mph shall be observed on all secondary range roads within the KGRA.

f. All drill holes will be plugged and abandoned according to Geothermal Resources Operational Order #3.

g. All piles, pits, sumps and other disturbed areas shall be recontoured to either BLM or NAVWPNCEN specifications upon site abandonment, according to instructions from the responsible agency (BLM or the NAVWPNCEN).

h. All disturbed areas no longer required for operations shall be revegetated immediately after cessation of operations, per BLM and NAVWPNCEN direction.

i. All trash, equipment and waste shall be removed and properly disposed of as soon as possible. Hazardous waste (such as hydraulic fluids and crankcase oil) shall be properly containerized and disposed of at authorized sites outside of the NAVWPNCEN.

j. Any proposed activities not previously authorized will not be allowed without specific approval from the responsible agency (BLM or the NAVWPNCEN).

6. Developers will be responsible for enforcement of all stipulations through on-site enforcement or compliance officers. The name and telephone number of the responsible compliance officer shall be provided to the NAVWPNCEN with submittal of Sundry Notice applications.

SCOPE OF WORK

BASELINE AND MONITORING STUDY OF PROPOSED COSO GRAZING EXCLOSURE

COSO KNOWN GEOTHERMAL RESOURCE AREA

Philip and Barbara Malloch Leitner

March 12, 1988

BACKGROUND AND JUSTIFICATION

Early reservoir estimates suggested that up to 2500 megawatts of electric generating capacity might be developed in the Coso Known Geothermal Resource Area (KGRA). At present a 25 megawatt demonstration unit is in operation, and up to 226 megawatts additional capacity is planned. Up to 848 acres of desert scrub habitat is committed to development or soon to be committed as part of projects built or under consideration. This amounts to 3.3 acres per megawatt under present engineering design and reservoir characteristics: future development may require a higher or lower land surface-to-megawatt ratio.

Biological resource studies conducted in the Coso KGRA in 1978 and 1979 demonstrated that much of the area with the highest potential for geothermal development supports the Mohave ground squirrel (Spermophilus mohavensis), a species listed as threatened by the California Department of Fish and Game (CDFG). CDFG has indicated that loss of Mohave ground squirrel habitat is an issue of significance and that mitigation measures developed for previously-permitted projects are no longer adequate. CDFG priority for mitigation is to compensate for lost Mohave ground squirrel habitat by enhancing remaining habitat. Such on-site, in-kind mitigation may, of course, benefit other indigenous wildlife species as well.

Geothermal resource developers currently active in the Coso KGRA (California Energy Company, Inc. and the Los Angeles Department of Water and Power) have expressed interest in a comprehensive biological resource mitigation program addressing full-field development impacts of up to 2,260 acres as estimated in the Bureau of Land Management Leasing EIS (BLM 1980). Discussions between the developers and CDFG concerning biological resource mitigation have been ongoing and a variety of compensation alternatives have been discussed. Meetings in January and February, 1988, between the developers and resource managing agencies (U.S. Navy, BLM and CDFG) culminated in an agreement to develop a comprehensive mitigation plan.

The central goal of the mitigation program is elimination of grazing pressure by domestic cattle. Cattle may adversely impact the Mohave ground squirrels directly, by competing with

them for limited forage; or indirectly, by trampling ground squirrel burrows and by reducing shrub cover necessary for ground squirrel thermoregulation and protection from predators.

The specific goals of the Mohave ground squirrel mitigation plan are:

1) To improve the quality of remaining habitat for the Mohave ground squirrel within the geothermal development area, given present knowledge about its habitat requirements;

2) To evaluate the effectiveness of the habitat improvement program; and

3) To develop information about habitat requirements that may be used to more clearly define the relationship between the Mohave ground squirrel and livestock.

This scope of work is directed toward satisfaction of the second and third objectives. Concurrent with development of this scope of work, implementing agreements between developers, surface and resource managing agencies are being prepared. These agreements will set forth actions required to exclude cattle from the managed area, the entity responsible for each action, the timetable, and cost-sharing arrangements.

OBJECTIVES OF THIS STUDY

1. Document the existing baseline status of the Mohave ground squirrel and its environment in the Coso KGRA, with emphasis on its potential competitors and the plant populations of greatest importance to the Mohave ground squirrel.

2. Monitor the status of the Mohave ground squirrel in the Coso KGRA after establishment of the Coso Grazing Exclosure, with emphasis on the Mohave ground squirrel's potential competitors and the plant populations on which it depends.

STUDY PLAN

I. Schedule

In the desert environment, plant and animal response to removal of grazing pressure is likely to be a slow process. Therefore, baseline and monitoring studies must be conducted over a number of years. The proposed schedule is as follows:

1988 Baseline study
1989 Baseline study
Coso Grazing Exclosure established in Fall 1989 (includes fencing, control of water sources)

1991 Monitoring study
1993 Monitoring study
1995 Monitoring study
2000 Monitoring study (contingent on continuation of the geothermal project)

Baseline studies must be scheduled for both 1988 and 1989 because of 1) the potential for significant year-to-year fluctuation in environmental variables such as rainfall and primary production and resultant fluctuations in Mohave ground squirrel population levels from year to year; and 2) the need to test and validate sampling methodologies being tailored to this specific study and site.

Extension of monitoring studies out to ten years after establishment of the exclosure is necessary in order to 1) document changes in shrub parameters (desert shrubs grow slowly and at least a decade of elapsed time can be required to show signficant changes); and 2) evaluate the long-term persistence of trends in Mohave ground squirrel populations.

II. Study Design

A. Study Site Selection

Four permanent study sites will be established, two within the Coso Grazing Exclosure that are currently receiving use by cattle, and two nearby in similar habitat that will continue to be subject to regular use. The study sites will be 500 by 500 meters in size, comprising 25 hectares (about 60 acres). Two natural communities, Mohave mixed woody scrub and Mohave creosote bush scrub, are the most widespread and extensive communities in the KGRA: the study sites will represent these communities both within and outside the grazing exclosure. Criteria for selection are as follows:

1) natural community present;
2) topography, soils, slopes;
3) estimated intensity of use by livestock;
4) presence of adequate numbers of Mohave ground squirrels to make useful between-year comparisons;
5) likelihood of geothermal or other surface disturbance through the year 2000; and
6) ease of access and acceptability to surface managing agencies (Sites within the Naval Weapons Center will be subject to Navy approval).

Preliminary field studies will be carried out in March and April 1988 for the purpose of selecting the four study sites. By April 30, the sites will be selected and submitted to participating entities.

B. Vegetation Studies

Vegetation studies will document the condition of both shrub and herb layers. Shrub condition, including recruitment of new individuals, is a function of grazing pressure and weather events and tends to change slowly. Shrubs may be most important to Mohave ground squirrels as shade for thermoregulation or as cover against predators while foraging on the herbs beneath. Herbaceous vegetation made up the majority of the diet of Mohave ground squirrels studied in northwestern Los Angeles County (Recht, 1977). Although vital as a principal food source, the biomass and species composition of desert annuals may fluctuate considerably from year to year based on weather conditions.

Shrub sampling will document cover, species composition and recruitment. The methods employed will be subject to review as information is obtained on Mohave ground squirrel habitat requirements. One approach is to use methods similar to Henrickson's (1980) field surveys as part of the Coso KGRA EIS; these are step-point and line-intercept methods. Another is to fly low-elevation aerial photography (flown in conjunction with other studies); this would provide a permanent record of shrub species composition, cover, and frequency for each 60-acre study plot. This method would permit flexible analysis of the data by plot subsections to test relationships between ground squirrel densities and the structure of the shrub layer. Recruitment must be measured in the field using a method such as belt transects in which the number and species of shrubs below a certain size limit are noted. The shrub measurements may be taken once during the baseline period, once in 1993, and once in the year 2000.

The herbaceous layer, which is more variable from year to year, will be sampled each year that live-trapping is carried out. Species composition and cover estimates will be recorded in small plots. Standing crop (above-ground biomass) will be measured in the field using air-dry weights at the end of the sampling period (late June). The between-shrub herbaceous layer and the under-shrub layer will be sampled separately, since plant production and rodent use in each may be quite different. When food-habits studies are in progress, the phenological condition of annual plants will be recorded as an indicator of food availability and moisture content, factors suggested by Recht (1977) as critical to the Mohave ground squirrel.

The exact methodology for vegetation sampling should be tailored to measure those habitat parameters most important to the Mohave ground squirrel. The sampling program may be modified based on information gathered as part of the food habits study (see below). For example, if a limited number of plant genera are determined to be of particular importance, more quantitative methods may be employed to monitor these species.

C. Wildlife Studies

Food Habits Study. Little is known of the food habits of the Mohave ground squirrel. The most detailed study was based on observations of a small number of animals at a site in northwestern Los Angeles County (Recht, 1977). No information is available concerning food habit overlaps between the Mohave ground squirrel and potential competitors, in this case, antelope ground squirrel, black-tailed jackrabbit, cattle and feral burros. Therefore, a food habits study will be carried out during the first year of the baseline period. Data will be gathered on important seasonal foods for the Mohave ground squirrel and its potential competitors. It should aid in developing more focused vegetation surveys and in interpreting trends in Mohave ground squirrel trapping studies.

Analysis of fecal samples is preferred over stomach-content analysis, since no sacrifice of animals is required. Samples can readily be obtained from live-trapped animals. Samples will be collected six times at three week intervals throughout the four month period when the Mohave ground squirrel is most active, April-July 1988. Frequent sampling is needed because Recht (1977) found that Mohave ground squirrels shifted from one principal food source to another several times during their active season. Ten samples will be taken at six intervals from each of the four study sites, for a total of 240 samples. As indicated in the previous section, the phenological condition of local plant species will be collected at each sampling interval to help develop information on food availability.

Analysis will also include fecal samples of other herbivores which potentially compete with the Mohave ground squirrel. Fecal samples of antelope ground squirrels will be taken during the live-trapping studies. Jackrabbit, burro and cattle fecal material will be collected, as available through the sampling period, and analyzed for comparison.

Methods for analysis will follow standard procedures outlined in the Wildlife Management Techniques Manual (Korschgen, 1980) and those used by Terry Foppe at the Composition Analysis Laboratory at Colorado State University, Ft. Collins. A reference collection of slides containing epidermal cells of local plant species and genera will be developed. Fecal analysis studies will be augmented with field observations of Mohave ground squirrel foraging behavior during the principal live-trapping period in May and June (see below). Comparison of food availability (through vegetation studies), food selectivity (through direct observation) and digestibility (by comparing direct observations with fecal analysis) should provide a reasonably clear picture of the food habits of the Mohave ground squirrel, as well as provide some indication of overlap with the food requirements of other local herbivores.

Estimate of Grazing Pressure. Information is sketchy on the grazing pressure presently posed by cattle within the Coso KGRA, since the area comprises only a portion of an allotment. Woodward and McDonald (BLM 1980) concluded that the range within the proposed exclosure area was in poor condition due to prolonged overutilization. In the past two years, an estimated 70-150 head of cattle used the range within the proposed exclosure for a six-month winter period (November-May); however, this level of use is less than previous use as estimated by BLM and projected future use without the grazing exclosure. Once range condition has improved as a result of current feral burro management efforts, the lessee will be allowed to return to stocking rates approximately double those now in effect.

Livestock use will be quantified by walking transects and recording the number of droppings by species. All droppings will be spray-painted when counted. Transects will be walked both before and after establishment of the Coso Grazing Exclosure (in 1986 and 1991 in each of the study sites) as well as in selected areas throughout the KGRA. Photopoints will be established in the study sites to document range condition.

Sampling for Mohave Ground Squirrel. The relative abundance of Mohave ground squirrels will be determined on each of the four study sites by mark-recapture sampling using a standard live-trapping technique. Each 500 by 500 meter site will be used as a trapping grid. A total of 441 Sherman live traps will be deployed in a 21 x 21 trap grid with 25 meter spacing between trap stations. All sampling will be conducted between May 20 and June 30, when Mohave ground squirrels are most active. Trapping will be carried out for five days at each site. Traps will be open for approximately four hours in the early morning and (if feasible) for an equivalent period in late afternoon. All animals captured will be marked for individual recognition and released unharmed. Traps will be shaded to prevent injury to ground squirrels from overheating.

This technique will provide data on the relative abundance of Mohave ground squirrels at each study site, ratio of juveniles to adults, body mass, home range size, and movements. It may be possible to estimate the number of squirrels present on each study site or to estimate actual population density, although this will not be known until the results of the 1988 baseline study are available for analysis. Because of the intensive trapping effort over a relatively large area (25 hectares), the technique should be sensitive enough to detect significant year-to-year changes in important population parameters.

REPORTING AND REVIEW SCHEDULE

A comprehensive annual report will be completed by the end of each calendar year in which studies are carried out. This report will be distributed to all cooperating entities involved in the study. The results of the study or any of its components will become available for publication in appropriate scientific journals or for presentation at scientific meetings and conferences. All cooperating entities will have the right to review manuscripts prior to publication or public presentation. In addition, a coordinating meeting will be held once annually with the agencies and the geothermal resource developers to report on progress to date, to evaluate costs, to solicit technical input from participating entities, and to resolve questions as they come up.

REFERENCES CITED

Bureau of Land Management. 1980. Coso Leasing EIS. Bureau of Land Management, Bakersfield, CA.

Henrickson, James. 1980. Botany of the Coso Geothermal Study Area. In: Rockwell International. 1980. Field ecology technical report on the Coso Geothermal Study Area in support of Coso Geothermal Development Environmental Statement. Bureau of Land Management, Bakersfield, CA. 97 pp.

Korschgen, Leroy J. 1980. Procedures for food-habits analyses. Pp. 113-128 In: Wildlife management techniques manual. Sanford Schemnitz (ed.). The Wildlife Society, Washington, DC (Fourth edition).

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DEPARTMENT OF THE NAVY
NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555-6001

RECEIVED MAR 9 1990

Tibbs
Varanini
Hopkins
McClenahan/gj

—Biology
—Compliance

5090
Ser 2606/2736
6 Mar 90

Phil Essner
California Energy Company, Inc.
601 California Street, Suite 900
San Francisco, CA 94108

Dear Mr. Essner:

Enclosed is a copy of the interagency letter adopting California Energy Company's proposal to modify a portion of the Mohave ground squirrel Mitigation Plan for geothermal development at Coso. The proposal was approved by the Bureau of Land Management and the Naval Weapons Center on February 20, 1990. California Department of Fish and Game formally concurred on February 27, 1990. We understand from our discussions with your Company's management at Coso District that fieldwork implementing the Plan modification will begin this spring .

If you have any questions concerning this matter, you may call me at (619) 939-3411, extension 229. We look forward with interest to the results of this year's baseline studies.

Sincerely,

Carolyn A. Shepherd

CAROLYN A. SHEPHERD
Environmental Manager
Geothermal Program Office

Enclosure: Interagency Letter

Copy to: (w/o encl)
California Energy Company, Inc. (Coso District)
Bureau of Land Mangement/Ridgecrest (L. Delaney)

Received Time Feb. 4 11:32AM

03/06/90 E337

Print Time Feb. 4 11:46AM

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
RIDGECREST RESOURCE AREA
112 East Dolphin Avenue
Ridgecrest, California 93555
(619) 375-7125

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
3200
(CA-065.52)

FEB 20 1990

Mr. George Nokes
Department of Fish and Game
Region 4
1234 E. Shaw Avenue
Fresno, California 93710

Dear Mr. Nokes:

I am writing this letter in behalf of the Bureau of Land Management and the Navy, China Lake Naval Weapons Center to present a proposal changing a portion of the Mohave ground squirrel Mitigation Plan for development at the Coso Geothermal Area and to seek your concurrence with these changes.

Background

On March 10, 1988, a plan for mitigating impacts to the Mohave ground squirrel as a result of field development and production at the Coso Geothermal Area was forwarded for your review and concurrence. The plan was reviewed and concurrence issued by your office on March 22, 1988. During the following months, the specific goals and objectives, scope and detailed elements of the plan were refined by the interested regulatory agencies and the geothermal developer. On October 5, 1988, a reformulation of the original plan was released for your review and concurrence was issued on October 7, 1988. This document was titled "Stipulation of the Mitigation of Impacts to the Mohave Ground Squirrel at the Coso Known Geothermal Resource Area" and shall hereafter be referred to as the MGS Mitigation Plan.

Results of Prior Studies

On page four (4) of the MGS Mitigation Plan under Part 5 is the section entitled "Baseline and Monitoring Program". Paragraph three of this section states, "BLM and NAVWPNCEN, in conjunction with the CDFG and other invited parties, shall review the baseline and monitoring data on a periodic basis (to be established by mutual agreement). BLM, NAVWPNCEN, and CDFG will determine if the mitigation measures have been met, exceeded or fallen short of the goal and objectives of this plan. These reviews shall also produce recommendations for modification of the plan, as necessary, to increase the likelihood of obtaining the goal and objectives."

The baseline studies as proposed in this section, specifically during the years of 1988 and 1989, have been completed. The 1988 study results have been formally reviewed and the 1989 results have been distributed for review. A comparison of the 1988 study results to the 1989 study results yielded interesting information that affects the establishment of a representative baseline from which future comparisons will be made.

During the 1988 study season, the trapping of the study sites occurred between May 25th and June 30th. To summarize, both juvenile and adult populations of the MGS were captured, with the juveniles far outnumbering the adults. The biological consultants, Phillip and Barbara Leitner, noted this fact but offered no firm explanation in the 1988 report. During the 1989 study season, the four sites were again trapped in May and June. In addition, a portion of study site 3 which was also trapped during March and April in order to collect fecal samples for food habits analysis. The March and April trapping period yielded adult populations of the MGS only. No juveniles were captured. During the May and June trapping periods, only a small number of adults were captured and juveniles were nonexistent. A close comparison of the data gathered during the 1988 and 1989 seasons indicates that the best time to trap the adult population of the MGS, which represents the most stable fraction, is the early spring during March and April.

Proposed Changes in the MGS Mitigation Plan

The proposed changes in the MGS Mitigation Plan are presented in the enclosure. In summary, the baseline study will be extended for one year. The principal investigators propose to trap during March and April and also attach radiotransmitters to determine when the adult population enters estivation. Population estimates will be aided by the use of a new marking technique. Tiny microchips will be injected subcutaneously to provide permanent identification for each ground squirrel. Portions of the grazing exclosure fence will remain open to allow baseline grazing conditions to continue.

Conclusion

In light of the results of the 1988 and 1989 studies, the baseline studies should be extended for one year to conclusively determine the representative baseline populations of the Mohave ground squirrel at the four study sites. The proposal as presented by the principal investigators is adopted as a change in the MGS Mitigation Plan. Further work, which may be required as a result of the 1990 study will be considered only for 1991. The baseline must be established by the end of the 1991 study year.

We look forward to your concurrence with this proposed change. Should you have any questions or comments please feel free to contact Pete Milne or Carolyn Shepherd at (619) 375-7125 (Pete) and (619) 939-2700 (Carolyn).

Approved By:

Lee Delaney Date 2/20/90
Lee Delaney
Area Manager
Ridgecrest Resource Area
Bureau of Land Management

Carl Austin Date 20 Feb 90
Carl F. Austin
Head, Geothermal Program Office
Public Works Department
China Lake Naval Weapons Center
By direction of the Commander

Concurrence By:

George D. Nokes Date 2/27/90
George D. Nokes
Regional Manager
Department of Fish and Game
State of California-The Resources Agency